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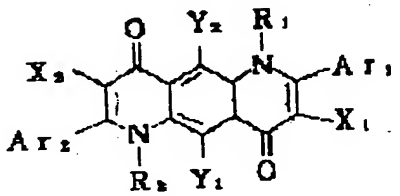
(54) ORGANIC ELECTROLUMINESCENT ELEMENT

(57)Abstract:
PROBLEM TO BE SOLVED: To provide an organic electroluminescent element with its superior light emission efficiency and high light emitting luminance by containing 2,7-bis aryl pyrido[2,3-g]quinolin-4,9-dion derivative in a luminous layer containing a luminous organic compound sandwiched between a pair of electrodes.

SOLUTION: Between a pair of electrodes, a luminous layer containing a luminous organic metal complex and a positive hole injection transport layer and/or an electronic injection transport layer are sandwiched as required, thereby providing an organic electric field light emitting element. In at least one layer between the electrodes, preferably in a luminous layer or an electronic injection transport layer, one or more kinds of 2,7-bis aryl pyrido[2,3- g]quinolin-4,9-dion derivative expressed by a formula (wherein Ar1 and Ar2 are aryl groups, R1 and R2 are H, an alkyl group, and an aryl group, X1 and X2 are H and alkyl group < Y1 and Y2 are H, a halogen atom, an alkyl group, an alkoxy group, a cyano group). Its contents are preferably about 0.001 to 99.999 wt.% in the luminous layer and 0.1 to 40% in the electronic injection transport layer.



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CLAIMS

[Claim(s)]
[Claim 1] Organic electroluminescence devices which come at least to pinch the layer which contains 2 and 7-bisallyl pyrid [2 and 3-g] quinoline -4 and at least one sort of 9-dione derivatives in inter-electrode [of a couple] further.
[Claim 2] Organic electroluminescence devices according to claim 1 whose layer containing 2 and 7-bisallyl pyrid [2 and 3-g] quinoline -4 and at least one sort of 9-dione derivatives is a luminous layer.

[Claim 3] Organic electroluminescence devices according to claim 1 whose layer containing 2 and 7-bisallyl pyrid [2 and 3-g] quinoline -4 and at least one sort of 9-dione derivatives is an electron-injection transporting bed.
[Claim 4] Organic electroluminescence devices according to claim 1 to 3 to which the layer containing 2 and 7-bisallyl pyrid [2 and 3-g] quinoline -4 and at least one sort of 9-dione derivatives is characterized by containing a luminescent organometallic complex.
[Claim 5] Organic electroluminescence devices according to claim 1 to 4 which have a hole-injection transporting bed further in inter-electrode [of a couple].
[Claim 6] Organic electroluminescence devices according to claim 1 to 5 which have an electron-injection transporting bed further in inter-electrode [of a couple].

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to organic electroluminescence devices.
[0002]
[Description of the Prior Art] Conventionally, although inorganic electroluminescence devices have been used as the panel type light sources, such as a back light, in order to make this light emitting device drive, the high voltage of an alternating current is required for them. Recently came and the organic electroluminescence devices (organic electroluminescent element : organic EL element) which used the organic material for luminescent material were developed [Appl.Phys.Lett., 51, and 913 (1987)]. Organic electroluminescence devices are elements which emit light using the light which has the structure pinched between an anode plate and cathode in the thin film containing a fluorescence nature organic compound, pours an electron and an electron hole (hole) into this thin film, and is emitted in case an exciton (exciton) is made to generate and this exciton deactivates by making it recombine. organic electroluminescence devices -- severalV- dozens -- it is the low battery of about V direct current, and luminescence of various colors (for example, red, blue, green) is possible by being able to emit light and choosing the kind of fluorescence nature organic compound The application to a light emitting device various in the organic electroluminescence devices which have such a feature, a display device, etc. is expected. However, generally, luminescence brightness is low and is not enough practically.
[0003] As a method of raising luminescence brightness, the organic electroluminescence devices which used for example, tris (8-quinolinolato) aluminum as a luminous layer, and used the host compound, the coumarin derivative, and the pyran derivative as a guest compound (dopant) are proposed [J.Appl.Phys., 65, and 3610 (1989)]. Moreover, organic electroluminescence devices were using screw (2-methyl-8-quinolinolato) (4-phenyl phenolate) aluminum as a luminous layer, and using the host compound and the acridone derivative (for example, N-methyl-2-methoxy acridone) as a guest compound are proposed (JP,8-67873,A). However, these light emitting devices are also hard to be referred to as having sufficient luminescence brightness. moreover, the organic electroluminescence devices which used the acridone derivative (for example, N-methyl-2-methoxy acridone) for the electron-injection transporting bed are proposed -- **** (JP,8-67873,A) -- the adhesion of the layer and electrode (for example, cathode) containing an acridone derivative was scarce, and the being improved made it clear on the occasion of prolonged use Now, organic electroluminescence devices which emit light in high brightness further are desired.
[0004]
[Problem(s) to be Solved by the Invention] The technical problem of this invention is offering the organic electroluminescence devices which are excellent in luminous efficiency and emit light in high brightness.
[0005]
[Means for Solving the Problem] this invention person etc. came to complete this invention, as a result of examining organic electroluminescence devices wholeheartedly. this invention namely, the layer which contains 2 and 7-bisallyl pyrid [2 and 3-g] quinoline -4 and at least one sort of 9-dione derivatives in inter-electrode [of ** couple] The layer containing the organic electroluminescence

devices which it comes to pinch further at least, ** pyrid [2 and 7-bisallyl] [2 and 3-g] quinoline -4, and at least one sort of 9-dione derivatives The layer containing the organic electroluminescence devices given in ** which is a luminous layer, ** pyrid [2 and 7-bisallyl] [2 and 3-g] quinoline -4, and at least one sort of 9-dione derivatives The layer containing the organic electroluminescence devices given in ** which is an electron-injection transporting bed, ** pyrid [2 and 7-bisallyl] [2 and 3-g] quinoline -4, and at least one sort of 9-dione derivatives Organic electroluminescence devices given in either ** characterized by containing a luminescent organometallic complex - **, ** It is further related with inter-electrode [of organic electroluminescence devices given in either ** which has a hole-injection transporting bed - **, and ** couple] at organic electroluminescence devices given in either ** which has an electron-injection transporting bed - ** inter-electrode [of a couple].

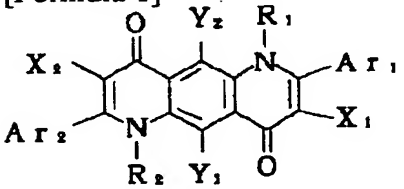
[0006]

[Embodiments of the Invention] Hereafter, this invention is explained in detail. The organic electroluminescence devices of this invention come at least to pinch the layer which contains 2 and 7-bisallyl pyrid [2 and 3-g] quinoline -4 and at least one sort of 9-dione derivatives in inter-electrode [of a couple] further.

[0007] It is the compound expressed with a general formula (1) and (** 1) preferably that what is necessary is just the compound which the aryl group replaced by the 2nd place, the pyrid [2 and 3-g] quinoline -4 and 9-dione skeleton, and the 7th place as 2 concerning this invention, 7-bisallyl pyrid [2 and 3-g] quinoline -4, and a 9-dione derivative (it is hereafter written as the compound A concerning this invention).

[0008]

[Formula 1]



(1)

(Ar1 and Ar2 express among a formula the aryl group which is not replaced [substitution or].) R1 And R2 A hydrogen atom, a straight chain, branching, or an annular alkyl group, Or the aryl group which is not replaced [substitution or] is expressed and it is X1. And X2 Hydrogen atom, Or a straight chain, branching, or an annular alkyl group is expressed, and it is Y1. And Y2 A hydrogen atom, a halogen atom, a straight chain, branching or an annular alkyl group, a straight chain, branching, an annular alkoxy group, or a cyano group is expressed.

[0009] It sets to a general formula (1) and is Ar1. And Ar2 The aryl group which is not replaced [substitution or] is expressed, and it is the heterocycle formula aromatic machine which is not replaced [the ring formula aromatic machine which is not replaced / substitution or /, substitution, or], and they are a ring formula aromatic machine with 6-30 total carbons, or a heterocycle formula aromatic machine with 3-30 total carbons more preferably. Ar1 And Ar2 The aryl group may have the substituent. For example, the alkyl group of carbon numbers 1-20, the alkenyl machine of carbon numbers 2-20, The aralkyl machine of carbon numbers 7-20, the aryl group of carbon numbers 6-20, the alkoxy group of carbon numbers 1-20, The alkoxyalkyl group of carbon numbers 2-20, the alkoxy alkyloxy machine of carbon numbers 2-20, The alkenyloxy machine of carbon numbers 2-20, the alkenyloxy alkyl group of carbon numbers 3-20, The alkenyloxy alkyloxy machine of carbon numbers 3-20, the aralkyloxy machine of carbon numbers 7-20, The aralkyloxy alkyl group of carbon numbers 8-20, the aralkyloxy alkyloxy machine of carbon numbers 8-20, The aryloxy group of carbon numbers 6-20, the aryloxy alkyl group of carbon numbers 7-20, The aryloxy alkyloxy machine of carbon numbers 7-20, the alkyl carbonyl group of carbon numbers 2-20, The alkenyl carbonyl group of carbon numbers 3-20, the aralkyl carbonyl group of carbon numbers 8-20, The aryl carbonyl group of carbon numbers 7-20, the alkyloxy carbonyl group of carbon numbers 2-20, The alkenyloxy carbonyl group of carbon numbers 3-20, the aralkyloxy carbonyl group of carbon numbers 8-20, The ant-RUOKISHI carbonyl group of carbon numbers 7-20, the alkylcarbonyloxy machine of carbon numbers 2-20, The alkenyl carbonyloxy group of carbon numbers 3-20, the

aralkyl carbonyloxy group of carbon numbers 8-20, The aryl-carbonyloxy group of carbon numbers 7-20, the aralkyloxy aralkyl machine of carbon numbers 14-20, The alkyl thio machine of carbon numbers 1-20, the aralkyl thio machine of carbon numbers 7-20, The aryl thio machine of carbon numbers 6-20, the annular alkyl group of hetero atom content of a carbon number 4-20, substituents, such as a halogen atom, a trifluoromethyl machine, a hydroxyl group, the amino group, N-substitution amino group of carbon numbers 1-20, carbon numbers 2-40N, N-JI substitution amino group, a nitro group, a cyano group, and a formyl machine, -- single substitution -- or it may be many replaced Furthermore, the aryl group contained in these substituents may be replaced by the alkyl group of carbon numbers 1-10, the alkoxy group of carbon numbers 1-10, the alkyl thio machine of carbon numbers 1-10, the aralkyl machine of carbon numbers 7-10, the aralkyloxy machine of carbon numbers 7-10, the hydroxyl group, the halogen atom, etc.

[0010] Especially desirable Ar1 And Ar2 They are a ring formula aromatic machine with single substitution or 6-20 total carbons which may be many replaced, or a heterocycle formula aromatic machine with 4-20 total carbons in the alkyl group of carbon numbers 1-10, the alkoxy group of carbon numbers 1-10, the aryl group of carbon numbers 6-10, the aryloxy group of carbon numbers 6-10, the alkyl carbonyl group of carbon numbers 2-10, a halogen atom, a trifluoromethyl machine, a hydroxyl group, and a cyano group. Ar1 And Ar2 As an example, for example A phenyl group, 1-naphthyl group, 2-naphthyl group, 2-anthryl machine, 9-anthryl machine, 3-furil machine, 2-furil machine, 3-thienyl group, 2-thienyl group, 3-pyrrolyl machine, 2-oxazolyl machine, 2-thiazolyl machine, 2-thiazolyl machine, 2-oxazolyl machine, A 4-iso oxazolyl machine, 2-thiazolyl machine, a 4-iso thiazolyl machine, 4-pyrazolyl machine, 4-imidazolyl machine, 2-imidazolyl machine, 4-pyridyl machine, 3-pyridyl machine, 2-pyridyl machine, 5-pyrimidyl machine, 2-pyrimidyl machine, A 2-pyrazinyl machine, 4-pilus DAJINIRU machine, 3-OKISAJINIRU machine, 2-thia JINIRU machine, A 3-benzofuranyl machine, a 2-benzofuranyl machine, a 3-benzo thienyl group, A 2-benzo thienyl group, 2-benzoxazolyl machine, 2-benzothiazolyl machine, A 2-benzo imidazolyl machine, 3-indolyl machine, 4-quinolinyl group, 3-KINORINI machine, 4-isoquinolinyl group, 4-cinchona bark ZORINIRU machine, 2-kino KISARINIRU machine, 6-phthalazinyl machine, 3-bear RINIRU machine, 3-carbazolyl machine, 2-FENAJINIRU machine, [0011] 4-methylphenyl machine, 3-methylphenyl machine, 2-methylphenyl machine, 4-ethyl phenyl group, 3-ethyl phenyl group, 2-ethyl phenyl group, A 4-n-propyl phenyl group, 4-isopropyl phenyl group, 2-isopropyl phenyl group, A 4-n-butylphenyl group, 4-isobutyl phenyl group, 4-sec - butylphenyl group, 2-sec - butylphenyl group, a 4-tert-butylphenyl group, A 3-tert-butylphenyl group, a 2-tert-butylphenyl group, A 4-n-pentyl phenyl group, 4-isopentyl phenyl group, 2-isopentyl phenyl group, A 2-neopentyl phenyl group, a 4-tert-pentyl phenyl group, A 2-tert-pentyl phenyl group, a 4-n-hexyl phenyl group, A 4-n-heptyl phenyl group, a 4-n-octyl phenyl group, 4-(2'-ethylhexyl) phenyl group, A 4-tert-octyl phenyl group, a 4-n-desyl phenyl group, a 4-n-dodecyl phenyl group,